CSIR NEWS

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Governing Body Discusses CSIR Reorganization

The Governing Body of the Council of Scientific & Industrial Research considered the proposals for the reorganization of CSIR at its meeting held at New Delhi on 21 September 1977 with Dr A. Ramachandran, Secretary to the Department of Science & Technology and Director General, Scientific & Industrial Research, as chairman. Welcoming the spirit in which the Government has proposed the reorganization the Governing Body underlined the need to establish strong linkages between the users of research results and the scientific institutions for developing research programmes so as to be totally relevant to the developing needs of the country and for utilization of the results and a dynamic growth of the nation. Taking note of the fact that many of the laboratories are multidisciplinary in character with a multiplicity of users in several sectors of the economy, the Governing Body decided that suitable organizational changes within CSIR and the laboratories should be made to exhibit a high degree of responsiveness to achieve these objectives.

Digital Correlator and Signal Averager : NAL

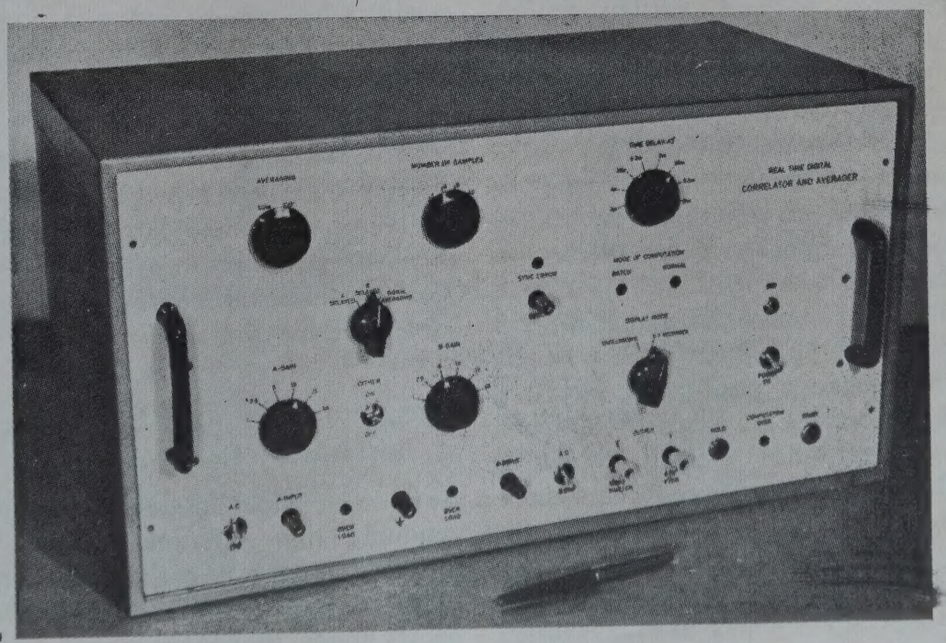
The National Aeronautical Laboratory (NAL), Bangalore, has developed a digital correlator and signal averager. This instrument processes analog signals on-line and in real time and presents the results on an oscilloscope or X-Y recorder. There are two analog inputs and the instrument can compute : (i) the auto correlation function of one input signal, (ii) the cross correlation function between two signals, and (iii) the wave shape of a signal buried in noise by signal recovery or signal averaging technique.

There are two separate input channels A and B with identical amplifiers with gain ranges of 50, 25, 10, 5, 2 and 1. Signal 'A' is quantized by a fine quantizer (8 bits) and signal 'B' is quantized by a coarse quantizer (3 bits). The coarse quantizer is linearized by internally generated wide band noise (dither).

In correlation mode this system simultaneously computes and displays 100 values of auto and cross correlation function at 100 equally spaced points. The distance between two points is given by time delay $\Delta\tau$, which is selectable from the ranges of values of 2, 4 and 20 μs, 0.2, 2 and 20 ms, and 0.2 s using front panel control. There is provision for selection of a number of process cycles from 2^7 to 2^{10} depending upon the requirement, from the front panel switch. The computation automatically stops after the chosen number of process cycles.

In averager mode, this machine recovers and displays the signal buried in noise at 100 equally spaced points. Again the distance between two points is $\Delta\tau$, selectable from the front panel. Here, the averaging sweep is initiated by a trigger pulse from an external source, whose repetition time must be at least $(100 \times \Delta\tau + 2.6)$ ms. There is an error indication lamp which glows if synchronization pulses repeat within the interval of $(100 \times \Delta\tau + 2.6)$ ms. Depending on the sweep number, a signal-to-noise ratio improvement of up to 40 dB can be achieved by this instrument.

The instrument has import substitution potential with wider applications in such areas as: vibration analysis and



Real time digital correlator and averager developed by NAL, Bangalore

structural analysis, aerodynamics and hydrodynamics analysis, measurement of acoustic absorption coefficient, noise source direction finding, contactless velocity measurements, measurement of torsion in rotating shafts, cross-correlation of electromyograms, speech research, radio astronomy, and studies of the dynamic behaviour of nuclear reactors.

Other specifications of the digital correlator and signal averager developed by NAL are :

Bandwidth of signal	: The input signal is sampled at a maximum rate of 500 kc/s. According to sampling theorem, this means that the input signal must be band-limited to 250 kc/s or less.
Input impedance	: Nominally 30 pf to ground shunted by 1 MΩ, input is overload protected.
Averaging	: Two modes are provided : (1) Summation averaging : Algebraic summation process. Output amplitude grows from stable base line. (2) Running averaging : Digital equivalent of RC averaging
Clock	: Internal clock; all timing signals are derived from crystal controller oscillator
Display	: On: (1) Oscilloscope, (2) X-Y recorder
System control	: Reset, start and hold functions are provided on the front panel.

Phenol Analysis by Gas Chromatography

Analysis of low-boiling isomers of phenols by gas chromatography on conventional packed columns has not been achieved so far owing to peak tailing on the one hand and lack of a single suitable stationary phase on the other. Although peak-tailing has been eliminated in some cases by converting the phenols to their methyl or silyl ethers, the procedures are cumbersome and time-consuming. As for the analytical difficulty on a single stationary phase, use of two different stationary phases has been suggested earlier. Selection of a suitable pair of stationary phases is also very important, because it is essential that a pair of components which overlap on one of the phases should necessarily be completely separated on the other phase and vice versa. Unfortunately no pair of stationary phases studied earlier satisfies the above requirements so far as the complete separation of *m*- and *p*-cresols, and 2,4- and 2,5-xylenols, in particular, are concerned.

Recent work at the Central Fuel Research Institute, Dhanbad, led to the development of the following pair of columns which eliminates peak tailing appreciably without converting the phenols to their methyl or silyl ethers and facilitates almost complete separation of all the peaks:

Column I—40% rubidium benzenesulphonate + 2% Carbowax 20M + 2% ascorbic acid on Chromosorb-P.

Column II—12% Apiezon L + 0.5% Carbowax 20M + 1% ascorbic acid on Chromosorb-W (acid washed)

On column I, a mixture of ten phenols containing phenol, three cresols and six xylenols separates into seven peaks which follow an elution order as 2,6-xylenol; *o*-cresol; phenol + 2,5-xylenol; *m*-cresol + 2,3-xylenol; *p*-cresol + 2,4-xylenol; 3,5-xylenol; 3,4-xylenol,

The same mixture on column II separates also into seven peaks which follow an elution order as phenol ; *o*-cresol; *m*-cresol + *p*-cresol; 2,6-xylenol; 2,4-xylenol + 2,5-xylenol; 2,3-xylenol + 3,5-xylenol; 3,4-xylenol.

Several ten-component mixtures of phenols have been analyzed on this pair of stationary phases with acceptable accuracy.

Development and Characterization of Carbon Fibres

Because of their unique property of retaining high strength as well as Young's modulus, carbon fibres find diverse applications starting from sports goods, food storage silos, fishing boats and transportation to the highly sophisticated area of aerospace, as for example, in rocket nozzles.

Most of the advanced countries are carrying out research in the development of carbon fibres and to understand the basic process of conversion of polymers to high performance carbon fibres. Development of carbon fibres from polyacrylonitrile (PAN) fibres involves two steps. The first step is the stabilization or oxidation of PAN fibres to yield high performance carbon fibres. Though much work has been reported on the pyrolysis of PAN fibres, there are many unsolved problems, viz. the exact role of oxygen during first stabilization of PAN fibres and the effects of various transformations taking place during oxidation of PAN fibres on the ultimate mechanical properties of carbon fibres. Shri L. M. Manocha of the National Physical Laboratory (NPL), New Delhi, undertook the development of carbon fibres and study of the various reactions involved during oxidation as well as carbonization of PAN fibres. The work was carried out under the guidance of Dr G. C. Jain and direct supervision of Dr O. P. Bahl.

The various transformations taking place during the conversion of PAN fibres to carbon fibres involving the step of preoxidation were studied. Detailed studies were carried out on the oxidized fibres as well as on the carbon fibres produced therefrom with respect to mechanical properties, X-ray diffraction studies, infrared spectroscopy, thermogravimetric analysis, differential thermal analysis and various structural models.

The reactions studied at different temperatures confirmed that low temperature oxidation of PAN is a combination of intermolecular as well as intramolecular reaction which go on side by side. The extent of these reactions was found to depend on the oxidation conditions. The properties, i.e. strength as well as Young's modulus, of carbon fibres are dependent on the properties and processing parameters of the oxidized fibres. It has been found for the first time that the

strength of the fibres was maximum for a certain degree of oxidation only. Oxidation time, temperature, oxidizing atmosphere as well as the elongation produced during oxidation were found to play an important role in deciding the ultimate properties of carbon fibres. The strength of carbon fibres goes on increasing with preoxidation time, showing a sharp inflection point. This point is more critical at higher temperatures. Though the properties of carbon fibres are improved by preoxidizing PAN fibres at higher temperatures in the presence of a suitable oxidizing atmosphere, particular attention should be paid in chcosing the preoxidation time. A novel laboratory method has been established to find the optimum conditions. DTA studies showed that the exothermic breakdown of PAN fibres during pyrolysis decreases with preoxidation time and results in higher yield. Various workers mention oxidation time as 10-20 hr. A special processing technique which not only reduces the preoxidation time to just one hour but improves the properties of carbon fibres has been developed. Based on the length changes occurring during preoxidation of PAN fibres a model has been suggested to explain certain reaction mechanisms during pyrolysis.

The next important step in the development of carbon fibres is the carbonization of oxidized PAN fibres. Though the nature of preoxidation affects the ultimate properties of carbon fibres, carbonization process is equally important. Many transformations take place during carbonization. These reactions were studied and models proposed to explain the shrinkage behaviour in the temperature region 200-1000°C. This carbonization shrinkage did not affect the ultimate properties of carbon fibres.

By studying the effect of various processing conditions on the ultimate properties of carbon fibres and by comparing them with various structural models, a theory was suggested; according to this, Young's modulus of carbon fibres depended not only on the alignment of the crystallites but also on the perfection of crystallites.

These studies led Shri Manocha to the award of a Ph. D. degree from the University of Delhi.

Training Course for IOC Engineers at IIP

A three-month training course for the chemical engineers of the Indian Oil Corporation Ltd (IOC) has been organized at the Indian Institute of Petroleum (IIP), Dehra Dun, from 16 August 1977. Sponsored by IOC, the course has been specially designed to train chemical engineers who are expected to work in the operating refineries.

Inaugurating the course, Shri T. K. Sinha, Chief Executive (Production), Refineries & Pipeline Division, IOC, appreciated the efforts of IIP in providing trained personnel to oil industry through various training programmes. Earlier, Dr I. B. Gulati, Director of IIP, outlined the scope of the training course and the role played by IIP in training the personnel for oil industry since its inception. The institute has so far trained more than 500 personnel for the oil industry.

The primary objective of this training course is to provide the trainees a good background of petroleum technology, especially familiarity with process, process design and operational aspects of the refinery. The course covers broadly : crude oil and products; introduction to application aspects of petroleum products; design procedure; solvent extraction; additives for fuels/lubes; conversion and treating process; bitumen; oil movement, storage and service; and planning and economic evaluation of process data. Besides, every trainee will deliver a seminar lecture in the area of refining/petrochemicals closely related to the subject matter of the course.

The faculty for the course comprises senior engineers from IOC, Engineers India Ltd, Oil & Natural Gas Commission and academic institutions, and scientists of IIP and other organizations.

IIP Assists Small Scale Industry in Import Substitution

The Indian Institute of Petroleum (IIP), Dehra Dun, has assisted Kareyn Precision Machines Pvt. Ltd, Dehra Dun, in the manufacture of hydromechanical governors used with water turbines. Presently these governors are being imported from USSR. Kareyn Precision Machines is a small scale unit enagaged in manufacture of precision mechanical components. IIP provided assistance in the precision making of one of the components of hydromechanical governors. The first completed unit of the governor was handed over to the representatives of the Bharat Heavy Electricals Ltd (BHEL), Hardwar, at whose instance the firm is manufacturing this instrument.

PROGRESS REPORTS

SITRA Annual Report : 1976-77

The annual report of the South India Textile Research Association (SITRA), Coimbatore, for 1976-77, brought out recently, summarizes the activities of the Association under the following sub-disciplines : Physics, Mechanical processing, Engineering, Operational studies, and Human relations. A noteworthy feature of the activities of SITRA is the assistance rendered to the public sector units during the past couple of years which has helped them to stabilize conditions in spite of problems faced by the industry as a whole. SITRA's help has also been sought by the various state governments in the southern region for reopening of some of the closed mills in this area. The conclusions arrived at by SITRA have been accepted by these governments, the bankers and the workers and many of the mills have been reopened as a result.

Tandem carding offers great scope in the direction of better utilization of cotton resources as it upgrades the cotton without removing any extra waste. However, the cost of conversion to tandem carding is quite high, being of the order of Rs 1 lakh. It has been felt in SITRA that two units of Crosrol Varga are not necessary since one unit is expected to eliminate 90% foreign matter present in web. Therefore, in order to take advantage of tandem carding and at the same time to reduce the cost of conversion, SITRA has been experimenting with a system of double carding with a simpler means of conversion. The results of these investigations have been encouraging so far.

The activities of the Association in the field of knitting were concerned with : chemical modifications to improve yarn quality; effect of waxing and moisture on knitting performance; and yarn quality in relation to fabric defects.

SITRA has developed, in collaboration with Sree Chitra Thirunal Medical Centre, Trivandrum, a vascular graft and a heart valve. This has been done by fabricating a special diameter knitting machine and the use of appropriate raw materials.

Another powerloom service centre has been opened at Salem, making a total of four centres. A project on techno-economic study of the handloom sector for achieving cost reduction and quality improvement, sponsored by the Commerce Ministry, was taken up during the year. Another project on the organizational and technical method necessary for maintaining and improving handloom garment exports was sponsored by the Handloom Export Promotion Council. The project on the wear life of cellulosics reached the final stage of commercialization and the coated spindle tapes have been in the market for more than a year. These were being marketed under the brand name SITRALISED.

The semi-automatic twist tester, fibre bundle strength tester and hand-to-cone winder were licensed during the year. The development of a fancy doubler was undertaken.

Certain projects in the field of human relations such as human factors in industrial productivity, analysis of disciplinary disputes referred to adjudication, surveying of technical and clerical staff requirements in textile mills, and a study of strike-free and strike-prone mills were also undertaken.

NAL Annual Report: 1975-76

The National Aeronautical Laboratory (NAL), Bangalore, has brought out recently its annual report for 1975-76. The 200-page report shows that the laboratory developed considerable expertise through its inhouse R & D programmes and intensified its interaction with the user organizations like ISRO, HAL, DRDO and other public and private sector organizations.

Wind tunnel tests for aircraft and missile models were carried out at the instance of the Hindustan Aeronautics Ltd (HAL), Defence Research & Development Organisation (DRDO) and Indian Space Research Organisation (ISRO). In all, 739 blowdowns were made in the 4 ft tunnel and another 1655 blowdowns in 1-ft tunnel. Majority of the tests for ISRO were towards the development of SLV-3 models. The testing covered static and aerodynamic tests on a 1/20-scale model, longitudinal and roll control tests on a 1/10-scale fin model to determine fin-tip control effectiveness, pressure distribution measurements and divergence tests. Force measurements on 1/10-scale models of the SLV second stage and SLV-RH-560 were also made.

An important achievement in the field of aerodynamics was the commissioning of a test rig for carrying out stage separation tests for satellite launch vehicles and aft end studies on aircraft models in the presence of an exhaust jet.

A project on the comparative performance evaluation of steam turbine blade profiles, sponsored by the Bharat Heavy Electricals Ltd (BHEL), was completed. This evaluation will be of considerable use to steam turbine designers in choosing the profiles for their optimum use and will serve as a basis for the development of new profiles.

A feasibility study on electrochemical machining of fir-tree roots for steam turbine blades was initiated on behalf of BHEL. The results obtained so far have shown that it is possible to hold a 25 μ tolerance for the fir-tree root.

Studies on the evaluation of alignment/reinforcement of asbestos fibres in the manufacture of pressure pipes were completed and suitable conditions for obtaining better fibre distribution in the composite were suggested. It was found that fibres treated with silicon tetrachloride phosphoric acid give improved strength. A method for preparing Cr_2O_5 in 1 kg batch was evolved.

The major part of the design of a vertical filament winding machine for winding large diameter pressure vessels was completed. A SALCOM (stress analysis of laminated composites) programme was developed for designing pressure vessels. Computer programmes were also developed for the generation of optimum end dome contours for both planar and helical winding patterns as applicable to pressure vessels/rocket motor casings.

Design and fabrication work on instrumentation and data logging system for a 3-tonne high temperature creep testing machine was completed. The instrumentation system consists of two LVDT type extensometers with associated signal conditioners, three high-temperature thermocouple sensors with low drift instrumentation amplifiers and a high stability reference temperature oven. The outputs of the extensometer and the thermocouple amplifiers are sequentially scanned by a digital data logging system and the data printed out on a teleprinter. An electronic programmer is incorporated to initiate the measurement cycle and

the print-out operation at a preset programmable time interval. The data logging system has been designed in such a manner that data from several creep testing machines can be logged by the same system by making a few modifications at a later date. With these developments, NAL has achieved capability for designing temperature control systems and strain rate recorders including teleprinting of data for banks of creep testing machines.

Foil type strain gauges were developed successfully. Production on pilot plant scale was being started. The gauges developed at NAL were found comparable in quality and performance with equivalent gauges produced by reputed manufacturers abroad.

A low turbulence blower tunnel has been designed and developed. It is a special-purpose wind tunnel capable of generating boundary layers which are considerably thicker than those in the usual wind tunnels. The tunnel is designed primarily to generate reliable and accurate data on turbulent boundary layers near and beyond separation. Such data can be utilized for critical testing of available theoretical turbulence models and for the development of improved production procedures. The tunnel can also be used for studies of aerofoils and vortex generators. The associated instrumentation systems such as miniature hot wire probes and combination probes, precision traverses and manometers of different types and ranges have also been developed. Turbulence measurement systems based on hot wire and laser doppler techniques were under development.

An acoustic testing facility for conducting vibro-acoustic tests on scaled structural models of aerospace vehicles in high intensity noise environment was created. This facility can also be used to conduct acoustic qualifications test on electronic equipment and other spacecraft hardware. The response studies on typical aerospace structure subjected to a random pressure field can also be carried out in this facility.

A 6-channel multipoint excitation and measurement rig for use in ground resonance testing of aircraft was developed. The equipment, built as a mobile console, houses, in addition to the phase and level controls, force and response measuring units, and safety sensing and logic circuitry to protect the structure under test.

During the year, 38 papers were published, 56 papers were presented in symposia and 67 reports of proprietary nature were prepared. The total expenditure of the laboratory was Rs 27.633 million. The total receipts from 4-ft tunnel operations, pilot plants, sponsored projects, testing and analysis, etc. was Rs 8.874 million.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

Glass-bonded Mica

Glass-bonded mica, known under different trade names like Mycalex, Mykroy, Havalex, Thermica and Supramica, having the moldability of plastics, the dimensional stability and thermal expansion of stainless steel, and the electrical properties of low-loss steatite and organic plastics, is a basic inorganic insulating material suitable for wide ranges of ambient operating conditions and electrical stresses.

Glass-bonded mica, comprising a low-temperature glass and mica flakes, is a stone-like material, grey to white in colour, having excellent electrical, mechanical and thermal properties. It is a versatile material that makes up for all the lacunae in plastics, ceramics and glass. Parts molded or machined out of glass-bonded mica operate satisfactorily up to 400°C continuously. They are also arc- and radiation-resistant and have thermal expansion matching stainless steel for making hermetic seals, headers and similar products. They are also characterized by zero moisture absorption, perfect seals, indefinite shelf life and the highest electrical breakdown stability.

Optimum conditions for the production of this material on laboratory scale have been worked out at the Central Glass & Ceramic Research Institute (CGCRI), Calcutta, and the product conforms to BS and ASTM specifications. The institute has developed two types of glass-bonded mica formulations based on lead-bearing and lead-free glass suitable for various end-uses. The properties of these formulations are as follows:

Physical	*Type I*	*Type II*
Density, g/cc	3.8	2.3
Water absorption, %	0.16	0.04
Impact strength, ft lb/in.	0.992	0.803
Modulus of rupture, psi	10,777	12,231
Compressive strength, psi	39,384	—
Heat distortion temp., °C	390	520
Electrical		
Power factor %, 1 Mc/s	0.101	0.18
Dielectric constant, 1 Mc/s	8.12	9.14
dc Resistivity, ohm-cm	8.45×10^{14}	9.6×10^{11}
Dielectric strength, kV/cm	1.77×10^{2}	2.07×10^{2}
Arc resistance (ASTM), s	+300	+300

Glass-bonded mica finds applications in bases and sockets for transmitter and receiver tubes, switchboard panel, arc-shields in high tension switches, circuit breakers, lightning arrestor gap-plates, jigs and fixtures in welding, soldering and induction heating, tubes, bases and coil-forms for high frequency applications, relay contact supports and X-ray components.

The actual demand for this material is not known but it is estimated at Rs 15-20 lakh/annum. This type of material is at present being imported.

The main raw materials are glass powder and mica powder.

Hydraulic press, moulds with heating arrangement, preheating furnace, annealing furnace and some machine tools are the equipment required. All the raw materials and equipment are available indigenously.

Because of low turnover in the beginning it is suggested that the pro-

cess should be taken up only by those firms which have facilities for high-temperature precision moulding and/or machining.

The capacity suggested for an economically viable unit is 18 tonnes/annum. The fixed capital required on plant and machinery is Rs 2.74 lakh and the working capital, Rs 65,500. The cost of production of the basic material is estimated at Rs 21.50/kg.

Further particulars can be had from the Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

CSIR SUPPORT TO RESEARCH

New Schemes

Studies on Lipids of *Streptomyces griseus*

Knowledge regarding the lipid composition of *Streptomyces griseus*, the fertile source of antibiotics, is scanty. In a new CSIR research scheme sanctioned to Dr G. K. Khuller of the Department of Biochemistry, Postgraduate Institute of Medical Education & Research, Chandigarh, it is proposed to undertake a detailed study of the nature of phospholipids and glycolipids, variation of these lipids with respect to age and conditions of growth of the organism and their metabolism. A better understanding of the biochemical components of *Streptomyces* could help in the development of better nutrients for growing these organisms which in turn would help in the improvement of antibiotics.

Fluid Dynamic Aspect of Blood Flow and Arterial Diseases

The analysis of blood flow in major mammalian arteries presents a number of interesting and challenging problems. This is because the flow is pulsatile through the vessels which are both elastic and of complex geometry and also because of limitations on instrumentation and access to vessels.

The fluid mechanical force has been identified in the literature as having an important influence on the location of sites of showing preferential development of arterial disease. The sites for the formation of atherosclerosis are generally at branching and shunts of arteries, and the cause is attributed to wall shear and disturbances in the flow. An equally important aspect of this disease is the diffusion of particular type of materials through the vessel wall.

The objective of this new CSIR research scheme, sanctioned jointly to Dr S. D. Nigam, Department of Mathematics and Dr M. Singh, Biomedical Engineering Division, Indian Institute of Technology, Madras, is to advance the knowledge of the blood flow in major mammalian arteries through experimental and theoretical work, under various types of flow conditions and to apply this knowledge to clinical problems.

Behaviour of Joints Between Wall Panels of Large Panel Prefabricated Building Components

Under a new CSIR research scheme sanctioned jointly to Dr A. R. Santhakumar and Shri A. Swamidurai, both of the Department of Structural Engineering, College of Engineering, Guindy, Madras, a series of joint models were subjected to reversed cyclic loading simulating seismic loads. The tests revealed certain advantages of using inclined loop reinforcements at the critical areas. Further studies proposed are: (1) computer analysis to quantify the deformation capacities of different types of joint reinforcements, (2) behaviour of these under dynamic cyclic loading condition, (3) effect of prestressing across the joint, (4) effect of gravity load on the ductility of the joints, and (5) effect of semi-rigid horizontal, as well as vertical, joints in a shear wall during elasto-plastic excursion. An efficient joint with suitable reinforcement disposition would be suggested. Such a joint would, in the long run, contribute to the utilization of prefab techniques for industrial as well as domestic structures in the country.

Corrosion Prevention of Underground Mining Equipment and Accessories

In a new CSIR research scheme granted to him, Dr N. S. Rawat of the Department of Chemistry, Fuel and Metallurgy, Indian School of Mines, Dhanbad, proposes to study the problem of corrosion and its prevention in underground mines. Scientific surveys and investigations will be carried out in different coalfields with a view to devising measures for preventing corrosion of mining machinery. The general outlines of the work will be as given below:

(i) Analysis of mine air, coal samples, etc. to throw light on mine environment.

(ii) Estimation of suspended impurities, dissolved impurities, total hardness, calcium hardness, magnesium hardness, alkalinity, sulphate, chloride, silica, dissolved oxygen, iron, manganese (all in ppm), saturation index and *p*H to indicate the corrosivity of mine water.

(iii) Study of temperature and humidity in coalmines, both the factors being dependent on the ventilation of the mines. When humidity in the atmosphere exceeds a certain critical point, say about 65%, a marked increase in corrosion occurs. Though the concentration of dissolved oxygen in water decreases with rise in temperature, the rate of corrosion increases with rise in temperature and attains a maximum around 80°C.

(iv) Microbiological corrosion — Collection of soil samples from various mine sites, identification of micro-

organisms, study of conditions favourable for growth of such organisms and methods of controlling their growth.

(v) Study of the products of corrosion metallurgically and chemically, and then the evolving of a mechanism of the probable corrosion process, which may be helpful in suggesting methods for minimizing or preventing corrosion.

(vi) Bench scale experiments and accelerated tests will be carried out as far as possible by simulating the underground samples of mine water. Attempts will also be made to study the corrosion resistance of different materials of construction normally employed in underground mines to find their suitability. Similar experiments will be carried out by coating the metal surfaces with different organic and inorganic coatings and inhibitors.

(vii) Wherever the underground and surface conditions are favourable, cathodic protection of the pipeline and similar structures will be undertaken after carrying out soil resistivity surveys.

Short-Term Workshop on Polymer Chemistry

The Central Leather Research Institute, Madras, is organizing its first short-term course and workshop on polymer chemistry from 1 to 5 December 1977. The course will be of interest to those involved in polymer/plastic, paint, textile, leather and rubber industries. Further particulars in this regard can be had from: Dr K. Thomas Joseph, course co-director, head of polymer division, Central Leather Research Institute, Madras 600020.

Indian National Committee for IHP Reconstituted

The Department of Science and Technology, Government of India, has reconstituted the Indian National Committee for International Hydrological Programme (IHP) for a period of three years with Shri B. Sivaraman, member of the Planning Commission, as its chairman. The terms of reference of the earlier committee have been retained. The committee has been authorized to constitute inter-disciplinary panels of experts.

The technical secretariat of the committee will function in the headquarters of the Council of Scientific & Industrial Research at Rafi Marg, New Delhi.

IHP Regional National Committees Meeting

A meeting of the Regional National Committees of IHP for North, East, Central and South Asia was held in Colombo from 8 to 13 August 1977. The Indian delegation consisted of the secretary of the IHP Committee Shri S. Banerji and two other experts, namely Shri C. V. Gole, member (water resources), Central Water Commission, and Shri B. K. Baweja, member, Central Ground Water Board.

The agenda included: (i) better understanding of regional hydrological problems and coordination of research; (ii) manpower requirements, transfer of technology and movement of experts in the region; (iii) exchange of information; and (iv) assessment of water balance of the Asian region.

One of the recommendations of the meeting was that Unesco should assist in the assessment of the need for training facilities, especially at technicians level. The need for a regional training course for technicians in integrated hydrology on the lines of Roorkee course run annually now for the senior engineers/scientists was specially voiced by the members.

However, a recommendation of great importance to National IHP Committee was a request that Unesco has been asked to make to the Government of India for helping the establishment of the Asian Regional Coordination Committee for Hydrology at New Delhi and requiring the National Committee to allow its secretariat with logistic support by the Unesco to service this committee. The members of this committee are India, Iran and Japan.

The meeting was held jointly with the WMO RA-II Working Group of Hydrology, which has recommended the formation of a working group for the Asian region water balance. India has been nominated one of the members of this group.

PERSONNEL NEWS

Appointments/Promotions

Dr A. K. Singh

Dr Anil Kumar Singh of the National Aeronautical Laboratory (NAL), Bangalore, has been appointed, on promotion, Scientist EI with effect from 24 March 1977.

Dr Singh (born 10 Sep. 1939) has had a brilliant academic career, obtaining his B. Sc. (1958) and M. Sc. (physics, 1960) degrees from D. A. V. College, Kanpur. He was awarded the Bhatnagar gold medal for securing the first rank in M.Sc. After brief services at the Christ Church College, Kanpur, and the Indian Institute of Science, Bangalore, Dr Singh joined the Physics Department of the Indian Institute of Technology, Madras, as a senior research fellow and obtained his doctorate degree in solid state physics (1966) for his work on X-ray diffraction studies on the structure of solids.

Dr Singh joined NAL in 1966 as a scientist, and has since been working on the characterization and analysis of materials by X-ray diffraction technique. As the recipient of a post-doctoral research fellowship at the Institute of Geophysics, University of California, Los Angeles, Dr Singh carried out research on high pressure from 1972 to 1976.

Dr Singh attended the ninth International Union of Crystallography held in Kyoto, Japan, in 1972 and presented a paper. In 1976, he gave seminars at the Institute of Solid State Physics, Tokyo University, Tokyo.

Dr Singh is currently engaged in the synthesis of materials at high pressures. He has 40 reports and papers to his credit.

Shri Ningiah

Shri Ningiah of NAL has been appointed, on promotion, Scientist EI with effect from 8 January 1977.

Shri Ningiah (born 8 April 1934) received his B. E. degree from the University of Mysore. After working as a junior engineer for nine months in Hydro Electric Project Division of Mysore PWD, he joined in 1961, a CSIR pilot project scheme concerning the design and development of transonic test section in the aeronautical engineering division of the Indian Institute of Science, Bangalore. There he was responsible for the detailed mechanical design of a 7 in. × 5 in. transonic test section.

On termination of this project he was absorbed in NAL, where he was subsequently promoted as chief draughtsman. He was solely responsible for detailed mechanical design and preparations of working drawings for all project groups. He was associated with the mechanical designs of a general-purpose low-speed wind tunnel and an experimental wind tunnel.

Shri Ningiah was deputed under Colombo Plan to the Aeronautical Research Laboratories (ARL) of Australia in 1967 where he underwent training in the field of aircraft fatigue testing and studied the fatigue test facilities developed at ARL.

After his return he has been responsible for the mechanical design and development of several fatigue test facilities in the laboratory. Currently he is working on the development of fabrication technology applicable to large filament-wound GFRP pressure vessels. Shri Ningiah has eight publications to his credit.

Shri M. Shivakumara Swamy

Shri M. Shivakumara Swamy of NAL has been appointed, on promotion, Scientist EI with effect from 19 April 1977.

After obtaining his B. E. (1960) from the Mysore University and M. E. (1962) from the Indian Institute of Science, Bangalore, Shri Shivakumara Swamy joined the design bureau of Hindustan Aeronautics Ltd (HAL). At HAL he worked on the design and development of HJT-16 aircraft and later carried out preliminary studies of a STOL freighter-cum-transport aircraft. He also worked on the preliminary design of the ground attack fighter aircraft, agricultural aircraft and advanced strike aircraft. Because of his wide experience in the field of aerodynamic design aspects of aircraft he was able to carry out the design testing and data analysis of aircraft and other type of flight vehicles soon after he joined NAL in 1970. He was closely associated with many HAL design studies of various fighter aircraft proposals.

He participated in the planning of the storm exchange project conducted by the India Meteorological Department on the R. A. E. Canberra Research Aircraft.

In 1973 he was deputed for a period of six months to work on the systems evaluation of the fighter aircraft with the systems analysis group of Ministry of Defence. Shri Swamy was deputed to France in June 1976 in connection with a certain aircraft project. He was one of the members of the analysis group of the AVRO Evaluation Committee during 1973-75. He is at present working on the problems related to air intakes of aircraft.

PATENTS FILED

9/Del/77 : A process for the production of a new coumarin, having spasmolytic properties, from aerial parts of the plant, A. Shoeb, R. S. Kapi, S. P. Popli, G. K. Patnaik & B. N. Dhawan—CDRI, Lucknow.

50/Del/77 : Improvements in or relating to silver oxide, etc., P. B. Mathur, N. Muniyandi & N.G. Karuppannan—CECRI, Karaikudi.

153/Del/77 : A device for collection and disposal of dust generated during electric rotary drills and compressed air drilling in rocks. J. K. Sinha, P. Kunhunny & S. Bagchi—CMRS, Dhanbad.

158/Del/77 : Improvements in or relating to the preparation of zinc pigmented paint in organic medium, K.S. Rajagopalan, S.N. Guruviah & V. Chandrasekaran—CECRI, Karaikudi.

160/Del/77 : Pretreatment for titanium mandrels used in electroforming of copper foils, B. A. Shenoi, S. K. Roy, V. Sivan & S. John—CECRI, Karaikudi.

NCIM Catalogue on Microorganisms

A catalogue of strains giving information on industrially important microorganisms maintained in the National Collection of Industrial Microorganisms (NCIM) at the National Chemical Laboratory, Poona, has been published. This is the first such compilation in India. NCIM maintains nearly 2000 cultures of bacteria, yeast and fungi which have been catalogued with relevant information such as source with their number, biochemical performance, literature references pertinent to these and other strain numbers and the accession numbers of other collections. The catalogue also serves as a guide for the selection of cultures for specific requirements which are listed alphabetically with cross references to microorganisms bearing NCIM numbers. The catalogue would serve as a handy reference book for microbiologists using NCIM cultures. Copies of the catalogue (priced at Rs 15 per copy) can be had from the Director, National Chemical Laboratory, Poona 411008.

RRL-Jorhat News

The Regional Research Laboratory (RRL), Jorhat, has started publishing a monthly house journal entitled 'RRL Jorhat News' from August 1977. Enquiries regarding the newsletter may be addressed to the Director of the laboratory.

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